

/853604.sch

Message 2:

From spo\_patent@spo.eds.com Wed Jul 29 09:02:34 EDT 1998

Received: from mail1.uspto.gov (mail1.uspto.gov [151.200.99.38]) by shell1.uspto.gov with ESMTP (8.7.1/8.7.1) id JAA06301 for <mayasyst@shell1.uspto.gov>; Wed, 29 Jul 1998 09:02:33 -0400 (EDT)

From: spo\_patent@spo.eds.com

Received: from spo.eds.com (www.spo.eds.com [192.238.49.35])

by mail1.uspto.gov (8.8.8/8.8.8) with SMTP id JAA02545

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Received: (from uucp@localhost) by spo.eds.com (SMI-8.6/pin1-2.2)

id IAA09313 for mayasyst@shell1.uspto.gov; Wed, 29 Jul 1998 08:03:55 -0500

Received: from spo.spo.eds.com by spo1.spo.eds.com (4.1/SPOUUCP-2.3)

id AA28726; Wed, 29 Jul 1998 07:59:48 CDT

Received: from spo4.spo.eds.com by spo.spo.eds.com (4.1/SPO-2.6)

id AA00121; Wed, 29 Jul 1998 07:59:45 CDT

Date: Wed, 29 Jul 1998 07:59:40 CDT

Message-Id: <199807291259.AA01990@spo4.spo.eds.com>

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To: mayasyst@shell1.uspto.gov

Sender: spo\_patent@spo.eds.com

Subject: Re: 853604.sch

X-Mailer: SPO Mail

Mime-Version: 1.0

X-Spo-Ctl-Id: <19980729\_075308\_spo\_29974>

Content-Type: text/plain; charset=us-ascii

Status: R

## CUSTOMER REQUEST SUMMARY

Your request was:

>e003

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>Word frequency list for document 853604

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>---search-id---

>853604, Manoharan V

>---search-id---

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>---word freq---

> 5 above 1 abstract

> 1 acceptable 2 accordance

> 1 according 1 accumulate

> 1 accumulated 1 adapted

> 1 advantageous	6 advantageously
> 1 advantages	1 again
> 1 all	3 also
> 1 alternative	1 although
> 39 and	1 angle
> 1 any	4 apffel
> 13 apparatus	1 apparent
> 1 appear	1 approaches
> 9 are	2 arranged
> 2 arrangement	2 art
> 1 aspect	1 aspects
> 2 assembly	1 assisting
> 3 associated	1 aterial
> 1 atmospheric	1 attempting
> 1 background	1 become
> 2 been	7 below
> 1 belt	1 belted
> 1 belting	1 between
> 1 billions	1 blocking
> 1 both	2 bottom
> 1 break	1 briefly
> 2 bulk	3 can
> 2 cavity	56 chamber
> 4 chambers	4 char
> 1 chopped	1 chunks
> 1 cifically	4 cleaning
> 2 closeable	1 cocling
> 1 communication	1 compound
> 1 comprise	13 comprises
> 3 comprising	1 concerns
> 1 conductive	1 confining
> 1 considering	1 contaminants
> 1 continues	2 convection
> 1 conveyed	1 conveying
> 3 conveyor	4 cooling
> 2 cost	1 costs
> 3 coupled	1 coverage
> 1 covers	1 created
> 3 creates	2 currents
> 1 cylinder	1 define
> 2 delivery	1 described
> 1 description	7 destructive
> 1 detail	1 detailed
> 1 develop	1 developments
> 1 device	1 devices

> 2 devolatilize	1 diagonally
> 1 difficult	1 directing
> 2 disadvantages	2 discarded
> 5 discharge	2 disclose
> 1 disclosed	1 discloses
> 1 disclosure	2 discussed
> 1 dispose	2 disposed
> 12 distillation	1 dobozy
> 1 down	1 drawbacks
> 3 drum	1 dumps
> 5 each	1 eferably
> 2 effective	1 efficiencies
> 1 efficiency	2 efficient
> 4 embodiment	1 embodiments
> 1 employs	1 enables
> 2 end	16 energy
> 3 environmental	1 equipment
> 1 establishing	1 estimated
> 3 example	1 expensive
> 1 explained	1 features
> 1 feeding	1 fiberglass
> 1 field	2 first
> 1 fluid	1 fluids
> 1 following	31 for
> 2 form	1 forth
> 1 found	1 four
> 1 fourth	1 frequency
> 15 from	1 fuel
> 8 further	6 gas
> 2 gases	5 gate
> 2 generated	1 grannen
> 1 gravity	1 ground
> 1 grow	2 has
> 3 have	1 having
> 7 heat	2 heated
> 1 heating	1 hereinbelow
> 2 high	5 holland
> 1 hot	5 housing
> 1 however	2 hydrocarbons
> 1 impact	2 implementation
> 1 important	8 includes
> 3 including	1 increasing
> 1 indicated	1 inline
> 1 input	1 instances
> 1 interest	3 into

> 9 invention	1 irradiate
> 28 irradiation	1 known
> 1 landfills	6 least
> 1 less	1 like
> 1 line	1 linear
> 1 listed	6 located
> 2 lock	1 low
> 1 maintaining	1 major
> 1 makes	1 manner
> 1 many	2 material
> 2 materials	14 means
> 3 member	1 metal
> 35 microwave	1 microwaves
> 1 million	1 minimal
> 3 more	1 mounted
> 1 multiple	1 nitrogen
> 1 nos	6 number
> 1 odd	1 often
> 1 oil	8 one
> 1 open	4 opening
> 2 opposite	1 order
> 5 other	2 output
> 1 over	3 padgett
> 1 parker	1 partially
> 1 particularly	1 pass
> 1 passage	6 patent
> 11 patents	1 pattern
> 1 permitting	1 placed
> 1 placing	2 plane
> 2 plurality	1 porous
> 1 portion	1 positioned
> 2 pre	1 predetermined
> 11 preferably	5 preferred
> 16 preheat	2 preheated
> 2 preheating	1 present
> 1 presented	4 pressure
> 4 prior	1 problem
> 2 problems	2 process
> 2 processes	1 produce
> 10 products	3 provide
> 2 provided	3 provides
> 7 providing	6 purge
> 1 purposes	8 pyrolysis
> 2 pyrolyzed	1 pyrolyzing
> 2 radiant	2 radiation

> 1 ratio	1 receipt
> 9 received	2 receives
> 3 receiving	1 recovering
> 1 reference	1 referred
> 1 referring	1 refers
> 1 regard	1 regarding
> 1 relate	1 relates
> 3 relatively	2 remaining
> 3 removing	1 required
> 1 respect	1 right
> 2 rotating	5 said
> 1 schippers	3 scrap
> 1 scraps	1 second
> 1 see	1 separated
> 1 serves	1 set
> 2 shield	2 shredded
> 2 side	3 sides
> 1 size	2 solid
> 3 some	1 spaced
> 1 spe	1 specifically
> 1 stable	1 standing
> 1 steel	3 stirrer
> 1 stirrers	1 straight
> 1 stream	1 subject
> 2 substantially	5 such
> 1 suffer	1 summarvof
> 1 supplies	5 supply
> 2 supplying	3 support
> 1 supported	1 supporting
> 1 system	1 taken
> 1 temperature	1 terminating
> 1 than	12 that
> 138 the	1 themselves
> 2 then	3 thereby
> 1 therefrom	6 therein
> 1 therethrough	2 thermally
> 3 these	2 this
> 1 those	2 through
> 20 tire	17 tires
> 1 transferred	1 transmits
> 1 transmitted	4 transparent
> 1 tread	2 tuned
> 1 two	1 ultrasonic
> 1 under	4 use
> 2 used	2 using

> 1 vacuum	1 various
> 1 vehicle	2 vertical
> 3 vertically	1 vibratory
> 2 wall	1 wallace
> 19 waste	1 wave
> 2 waveguide	1 waveguides
> 1 waveguide	1 way
> 3 well	2 when
> 3 wherein	7 which
> 2 while	9 whole
> 1 will	4 window
> 3 windows	9 with
> 2 within	1 without
> 1 would	1 year
> 1 years	1 zone

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>titles

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#### Sales Order Summary:

Customer ID:	12310
Sales Transaction Nbr:	142671
Date Posted:	July 29, 1998
Product:	E003
Quantity:	50

#### E003 WORD FREQUENCY SEARCH REPORT

#### Classification Analysis:

1. 201/25	Total=9 ORs=1 XRs=8
Class 201	DISTILLATION: PROCESSES, THERMOLYTIC
Sub 25	FEED OTHER THAN COAL, OIL SHALE OR WOOD

2. 110/229      Total=5   ORs=1   XRs=4  
    Class 110    FURNACES  
    Sub 218     WITH FUEL TREATMENT MEANS  
    Sub 229     .Means for liberating gas from solid fuel
3. 110/346      Total=5   ORs=3   XRs=2  
    Class 110    FURNACES  
    Sub 341     PROCESS  
    Sub 346     .Incinerating refuse
4. 110/257      Total=4   ORs=2   XRs=2  
    Class 110    FURNACES  
    Sub 235     REFUSE INCINERATOR  
    Sub 255     .With means for advancing or handling refuse or  
                 residue  
    Sub 257     ..Continuous advance
5. 201/19        Total=4   ORs=3   XRs=1  
    Class 201    DISTILLATION: PROCESSES, THERMOLYTIC  
    Sub 19      APPLYING ELECTRICAL ENERGY DIRECTLY TO MATERIAL
6. 201/2.5      Total=4   ORs=1   XRs=3  
    Class 201    DISTILLATION: PROCESSES, THERMOLYTIC  
    Sub 2.5     NON-MINERAL DISTILLAND WITH CATALYST OR CHEMICAL  
                 TREATMENT OF VOLATILE COMPONENT
7. 201/32        Total=4   ORs=0   XRs=4  
    Class 201    DISTILLATION: PROCESSES, THERMOLYTIC  
    Sub 32      IN A MOVING BED
8. 201/35        Total=4   ORs=0   XRs=4  
    Class 201    DISTILLATION: PROCESSES, THERMOLYTIC  
    Sub 35      CARBONIZING UNDER PNEUMATIC PRESSURE OR VACUUM
9. 202/117      Total=4   ORs=1   XRs=3  
    Class 202    DISTILLATION: APPARATUS  
    Sub 81      APPARATUS  
    Sub 82      .Systems  
    Sub 96      ..Thermolytic  
    Sub 105     ...Retort  
    Sub 117     ....Conveying
10. 585/241      Total=4   ORs=0   XRs=4  
    Class 585    CHEMISTRY OF HYDROCARBON COMPOUNDS  
    Sub 240     PRODUCTION OF HYDROCARBON MIXTURE FROM REFUSE OR

## VEGETATION

Sub 241 .From synthetic resin or rubber

### Patent Report:

Ref	Patent Id	Issue/File	US Class (OR)	Title
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1	05366595	Nov 22 1994 May 11 1993	201/19	Mobile apparatus for pyrolyzing carbonaceous material and related method
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Inventor: Padgett; Michael A. et al.

#### Abstract:

A loading mechanism places waste material into a porous rotatable cylinder that is mounted for relative rotation within an air-tight housing. Once loaded, the housing is sealed and oxygen is evacuated. A microwave heating device heats the waste material within the cylinder and breaks the waste material down into solid and fluid products. A drive motor simultaneously rotates the cylinder at high speed, creating centrifugal force on the waste material. The fluid products escape outwardly from the porous cylinder and are transferred to a heat exchanger chamber where they are cooled. A fractional distillation system stratifies the fluid products according to weight for purposes of recovery.

2	05084141	Jan 28 1992 May 11 1990	201/19	Process of destructive distillation of organic material
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Inventor: Holland; Kenneth M.

#### Abstract:

PCT No. PCT/GB88/00979 Sec. 371 Date May 11, 1990 Sec. 102(e) Date May 11, 1990 PCT Filed Nov. 11, 1988 PCT Pub. No. WO89/04355 PCT Pub. Date May 18, 1989.

The organic material (such as waste tire compound) is pyrolyzed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a microwave discharge zone 10 by means of conveyor 8; pyrolyzing the pre-heated material in the microwave discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

3	05387321	Feb 7 1995 Jan 27 1992	202/99	Apparatus for waste pyrolysis
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Inventor: Holland; Kenneth M.

#### Abstract:

Apparatus and method for the pyrolysis of waste material which is not



itself susceptible to heating by microwave radiation. The method comprises:

(a) contacting the waste material, under an atmosphere wherein flame generation is substantially prevented, with a bed of pulverulent carbonaceous material (such as pulverised scrap tires) which is susceptible to heating by microwave irradiation; and

(b) heating the pulverulent material by means of microwave irradiation so as to transfer thermal energy from the pulverulent material to the waste material and cause substantial pyrolysis of the waste material.

**The apparatus comprises:**

(a) a container 9 which is inert to microwave radiation and capable of retaining the bed of pulverulent material;

(b) a reaction chamber 8;

(c) a conduit 19 for feeding the waste material to an upper part of the bed of pulverulent material;

(d) a microwave generator 10;

(e) air locks 12 and 18 for controlling the atmosphere in chamber 8 such that flame generation is prevented in chamber 8; and

(f) outlet 20 for removal of gases, evolved on pyrolysis of the waste material, from chamber 8.

4	05330623	Jul 19 1994	201/19	Process of destructive distillation of organic material
		Jan 27 1992		

**Inventor:** Holland; Kenneth M.

### Abstract:

The organic material (such as waste tire compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a microwave discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the microwave discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

5 05167772 Dec 1 1992 202/105 Apparatus for pyrolysis of tires  
May 21 1990 and waste

Inventor: Parker, Sr.; Thomas H.

### Abstract:

Method and apparatus for pyrolyzing used tires into a char fraction, wire, fiberglass, oil fraction and gas fraction. The tires are continuously conveyed to a preheating chamber where they are heated to a temperature level of 200 F. to 400 F. The heated tires are metered into a cavity having disposed therein a ram system, which shapes and forces the whole tire into a pipe which leads to a pyrolyzing chamber. The tires form a plug at the front end of the system to prevent the release of toxic

gases into the atmosphere and also to prevent air from entering the pyrolyzing chamber. Similarly, solid residue produced by pyrolysis of the apparatus is forced into a discharge column, forming a plug to seal the system at its outlet end. An alternate embodiment of the invention apparatus operated manually can also be used for compacting, neutralizing and disposing of medical waste, infectious materials and the like as well as auto tires.

6 04647443 Mar 3 1987 423/449.7 Recovery process  
Jun 7 1985

Status: expired - failure to pay second maintenance fee

Inventor: Apffel; Fred

Abstract:

A process for economically recovering carbon black, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires are washed to remove dirt and road film. The clean tires are dried and preheated with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiber glass. The char is subsequently pyrolyzed with microwaves that elevate the tire temperature and devolatilize the remaining hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage. The solid residue from the tire pyrolysis is char, fiberglass and steel. The char is mechanically separated from the glass and steel. The char is milled to break down agglomerates and subsequently pelletized and bagged. The steel and glass are discarded as trash.

7 05057189 Oct 15 1991 202/113 Recovery apparatus  
Jun 12 1989

Inventor: Apffel; Fred

Abstract:

An apparatus for economically recovering char, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires may be washed to remove dirt and road film. The tires are dried and preheated with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiber glass. The char may be subsequently pyrolyzed with microwaves that elevate the tire temperature and devolatilize the remaining hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage. The solid residue from the tire pyrolysis is substantially char, fiberglass and steel. The char is mechanically separated from the glass and steel. Alternately, the char and the glass and steel are separated by dumping the hot mixture into

a water quench tank. The mixture is cooled. The char floats to the water surface and is removed. The glass and steel sink to the bottom of the tank and are removed separately. The char may be sold or burned or milled to break down agglomerates and subsequently pelletized and bagged. The steel and glass are discarded as trash.

8 04839151 Jun 13 1989 423/449.7 Recovery process  
Feb 27 1987

Inventor: Apffel; Fred

Abstract:

A process for economically recovering char, oil and fuel gas from vehicle tires is disclosed, for either whole tires or physically fragmented tires. The tires may be washed to remove dirt and road film. The tires are dried and preheated with super-heat steam. The hot tires are pyrolyzed to partially devolatilize a major portion of the hydrocarbons and produce a char that can be separated from the steel and fiberglass. The char may be subsequently pyrolyzed with microwaves that elevate the tire temperature and devolatilize the remaining hydrocarbons from the char as gas. The hot gases are cooled and partially condensed. The uncondensed gas is used as fuel. The condensed oil is sent to storage. The solid residue from the tire pyrolysis is substantially char, fiberglass and steel. The char is mechanically separated from the glass and steel. Alternately, the char and the glass and steel are separated by dumping the hot mixture into a water quench tank. The mixture is cooled. The char floats to the water surface and is removed. The glass and steel sink to the bottom of the tank and are removed separately. The char may be sold or burned or milled to break down agglomerates and subsequently pelletized and bagged. The steel and glass are discarded as trash.

9 05452670 Sep 26 1995 110/346 Waste recycling system  
Oct 15 1993

Inventor: Towne; Gary A.

Abstract:

A waste recycling system which separates the reusable components within waste such as tires by incomplete burning followed by a series of separation steps. The incomplete burning is carried out within a chamber having at least two hollow perforated rollers on which the waste is supported. The tires are ignited and caused to smolder within the chamber, allowing gaseous and vapor by-products to be released and travel downward into the rollers. Inorganic solid matter remaining from the combustion process continuously falls between the slowly rotating rollers into a removal bin or conveyor. The gaseous combustion by-products are directed through an oil bath filter having a mesh on which sprayers apply a cooling oil mist to capture the oil vapor. The remaining hydrocarbon emissions are burned incompletely, and the resulting carbon black within the effluent

filtered out. The effluent is then completely combusted generating heat and then scrubbed to emit a relatively clean gaseous discharge.

10 05101739 Apr 7 1992 110/229 Tire gassification and combustion  
Jan 4 1991 system

Inventor: Nance; Daniel et al.

Assignee: Utah Environmental Energy, Inc.

Abstract:

A system for disposing of materials such as vehicular tires and similar substantially organic matter and generating useful heat therefrom includes a first chamber, referred to as a gassification chamber, capable of holding a plurality of tires. The gassification chamber has an access way allowing for insertion of whole tires therein where they will be burned at a relatively low temperature resulting in incomplete combustion and the generation of combustible gases. A first air inlet is positioned substantially at the bottom of the gassification chamber with a first blower connected thereto. A gas outlet is positioned a first distance above the bottom of the gassification chamber confining the burning to the lower end of the gassification chamber. The combustible gas is removed and is conveyed to the lower end of a second chamber, referred to as a combustion chamber. A second blower is connected to a second air inlet at the bottom of the combustion chamber and an electric arc is used to ignite the mixture of air and combustible gas. A third air inlet is positioned a distance above the second inlet in the combustion chamber, and with a third blower connected to the third air inlet, promotes complete combustion of the combustible gases which are produced in the gassification chamber. The hot combustion products exit the combustion chamber relatively free of pollutants and are directed to a heat exchanger where the heat generated is put to a useful purpose.

11 05783046 Jul 21 1998 201/25 Process and apparatus for the  
Nov 28 1994 destructive distillation of rubber

Inventor: Flanigan; Virgil J.

Assignee: Gentech, Inc.

Abstract:

An improved process and apparatus for the destructive distillation or pyrolysis of rubber, such as used rubber tires, to produce liquid and gaseous hydrocarbons and a solid carbonaceous char. A heat transfer gas circulating in a circulation loop is used to cool the hot char produced in the distillation chamber of a distillation oven, the circulation loop having some means for removing the heat transferred to the heat transfer gas from the hot char. In one embodiment, two distillation ovens are operated in off-set, batchwise distillation cycles. The distillation cycles in the two ovens are coordinated so that a fresh charge of rubber feed is introduced into the distillation chamber of one of the ovens as

the distillation of rubber in the other oven is concluded. The heat transfer gas is then circulated through both distillation chambers of the two ovens such that heat is transferred from the hot char produced in one oven at the end of a cycle to the heat transfer gas, and then transferred from the gas to the cold rubber feed introduced into the distillation chamber of the other oven at the beginning of a cycle to preheat the rubber feed. An effective means for determining the distillation end point and a pressurized distillation oven door seal are also provided.

12 05411714 May 2 1995 422/232 Thermal conversion pyrolysis  
Feb 3 1993 reactor system

Inventor: Wu; Arthur C. et al.

Abstract:

A thermal conversion pyrolysis reactor system (10) is provided for use in providing a continuous flow type pyrolysis reaction for conversion of carbonizable input materials ("MW") (12). The reactor system (10) utilizes a diffusion material ("MD") (14) which is preheated and admixed with the MD (12) in order to facilitate pyrolysis and to partially catalyze reactions. Subsystems are provided to receive gaseous (30), liquid (32) and solid (32) phase outputs. The reactor system (10) includes further component subsystems for waste material MW input (22), MD input (26), reactor chamber (24), and heating (28). The MD (14) is preheated by being carried through the reactor chamber (64) prior to admixing with the MW (12) and further by exhaust gases (94) from the furnace space (88) being directed through a heat exchanger (126). The system (10) provides for recycling of MD (14) and is substantially self powered as a result of using combustible hydrocarbon gases produced by the pyrolysis reaction as fuel for turbulent burners (72). Input materials are evacuated of oxygen and a positive internal pressure is maintained in the reactor chamber (66) in order to maximally facilitate oxygen free pyrolysis. The system (10) is particularly adapted for use with tire chips, medical waste and industrial plastic waste input materials. Carbon black and pelletized metallic and alloy materials are preferred MD (14).

13 04123306 Oct 31 1978 156/96 Method and system for retreading  
Dec 29 1976 tires utilizing RF energy

Inventor: Landry; Robert G.

Assignee: Long Mile Rubber Company

Abstract:

The specification discloses a method and system for retreading tires wherein an uncured gum layer disposed between a vehicle tire carcass and a pre-cured tire tread is vulcanized by RF energy. An annular air bladder is received within the tire carcass and includes an annular conductive grounding strip. A hub is received within the center opening of the tire carcass and connects to the grounding strip. A chamber capable of

withstanding high pressures is dimensioned to receive the tire carcass. A shaft is horizontally rotatably disposed in the chamber and is adapted to connect to the hub. Drive structure extends through the wall of the chamber in order to rotate the shaft at a predetermined speed. A source of pressure is provided for pressurizing the interior of the chamber. An RF antenna extends from the chamber to a position adjacent the tire tread when the tire carcass is mounted for rotation about the shaft. A source of RF energy is located outside the chamber. A path is formed for the RF energy through the wall of the chamber in order to energize the antenna, such that RF energy is directed through the tire tread to heat the gum layer to an extent sufficient to vulcanize the tire tread to the tire carcass.

14 04371769 Feb 1 1983 219/746 Microwave heating apparatus  
Jul 30 1979

Inventor: Yoshimura; Hirofumi et al.

Assignee: Matsushita Electric Industrial Co., Ltd.

Abstract:

A microwave heating apparatus has a heating chamber in which an object is to be heated both dielectrically by microwave and by radiant energy. A microwave generator for generating microwaves is disposed above the heating chamber, and a radiant energy heater is located within the heating chamber. A rectangular wave guide extends between the generator and an opening in the chamber for guiding the microwaves generated by the generator into the heating chamber from above, the wave guide being bent generally in the shape of the letter Z and the portion of the wave guide other than the portion adjacent the opening into said heating chamber being spaced from the walls of the heating chamber. Thermal insulation is provided between the chamber and the portion of the wave guide spaced from the walls of the chamber.

15 05720232 Feb 24 1998 110/346 Method and apparatus for  
Jul 10 1996 recovering constituents from  
discarded tires

Inventor: Meador; William R.

Abstract:

Discarded rubber tires for reclamation and recovery of the constituents therein and/or environmentally safe disposal are transferred from a pan feeder system into a hopper and transferred by an auger into a pyrolysis chamber. The pan feeder system excludes air or oxygen from passing through the hopper and auger into the pyrolysis chamber. Tire pieces from the pan feeder system are transferred by an auger through the pyrolysis chamber which is heated to a temperature between 350 and 650 F. The pyrolysis chamber includes a vapor recovery system for removing the vapors and maintaining a vacuum in the pyrolysis chamber. The vapors are

withdrawn through a heat exchanger and into a liquid/gas separator where the condensed liquids are removed and the gas is recycled for fuel or other disposition. The solid residue from the tire pyrolysis is transferred by a closed auger to a closed bin. A pressure sensitive switch on the bin starts and stops the motor on an auger to discharge the solid residue for further processing, and thus maintains a minimum level of solid residue in the bin which acts as a seal to prevent air or oxygen from entering the pyrolysis chamber through the closed bin and closed auger. The solid residue is primarily carbon and steel which may be further separated by suitable equipment.

16 05023056 Jun 11 1991 422/186 Plasma generator utilizing  
Dec 27 1989 dielectric member for carrying  
microwave energy

Inventor: Aklufi; Monti E. et al.

Assignee: The United States of America as represented by the Secretary of the Navy

Abstract:

A plasma generator utilizes a dielectric member for carrying microwave energy from a microwave source directly into the hot zone of a thermally heated semiconductor process reaction chamber. The member carries the microwave energy much like fiber optics carries light so that the microwave energy may be delivered to and emitted at a specific preselected position within the chamber. A plasma can be formed and located directly over or near substrates so that a more highly controlled deposition and/or etching process may take place.

17 05636580 Jun 10 1997 110/257 Pyrolysis system and a method of  
Nov 22 1995 pyrolyzing

Inventor: Kanis; Douglas R.

Abstract:

A pyrolysis system is provided for use in the pyrolytic distillation of various feedstock materials, such system including an elongate reaction chamber with an upstream end, a downstream end, an infeed port near the upstream end and a discharge port near the downstream end. An auger is disposed in the reaction chamber to convey feedstock from the infeed port to the discharge port through the reaction chamber. In one embodiment, the auger includes a reverse section downstream from the discharge port to create an accumulation zone. An input airlock coupled to the reaction chamber near the upstream end delivers charges of feedstock through the input port into the reaction chamber and an output airlock coupled to the discharge port of the reaction chamber receives therefrom pyrolyzed material. Heat is supplied by a furnace disposed around the reaction chamber to supply heat thereto. The gas produced during the pyrolysis is extracted through a gas extraction vent disposed near the upstream end of

the reaction chamber.

18 05363777 Nov 15 1994 110/214 Waste heat treatment apparatus  
Sep 10 1992

Status: certificate of correction has been issued

Inventor: Yoshimoto; Katsunobu et al.

Assignee: Towa Corporation et al.

Abstract:

A waste heat treatment apparatus includes a waste accommodating chamber for holding and burning waste placed in the chamber which is positioned in an outer housing that also holds a recombustion section for after burning the burning gas. An ash pan collects waste after the burning and/or after a sterilization for removal from the outer housing. An exhaust fan exhausts the burning gas out of the outer housing. A catalyzer is positioned in a gas passage between the recombustion section and the exhaust fan. The waste accommodating chamber includes a heater for burning the waste, and the recombustion section includes a further heater for after burning the gas generated by the burning. This structure provides a relatively simple device which is compact and portable, whereby installation near the spot where the waste is produced, is facilitated.

19 04488935 Dec 18 1984 202/177 Solar/microwave vacuum continuous  
Mar 22 1982 feed distillation apparatus

Status: expired - failure to pay first maintenance fee

Inventor: Ruhe; Rodney C.

Abstract:

An apparatus for the distillation of a fluid containing at least two constituent components is disclosed. The apparatus includes a microwave energy source and a solar energy collector, both of which may be used to heat a subject fluid to a greater temperature for the purpose of distillation of same. Further, the disclosed invention combines a vacuum within the apparatus to facilitate operation and enhance the overall energy efficiency of the apparatus.

20 05728310 Mar 17 1998 219/679 Microwave waste sterilizer and  
Aug 2 1995 method of use

Inventor: Ice; Charles L. et al.

Assignee: Forward Systems Automation

Abstract:

There is provided a microwave waste sterilizer comprising an upper outer shell, a lower outer shell, an upper means for guiding microwave energy, a lower means for guiding microwave energy, an upper means for dispersing microwave energy, and a lower means for dispersing microwave energy. There is also provided a method for sterilizing waste materials with dual sources of microwave energy. Further there is provided a method



for dispersing microwave energy into a chamber such that the dispersed microwave energy creates a flux field of substantially uniform flux.

21 04045639 Aug 30 1977 219/700 Continuous microwave and vacuum  
Dec 3 1975 dryer

Inventor: Meisel; Nicolas

Assignee: Food Processing Systems Corporation

Abstract:

This invention relates to an apparatus, namely a continuous microwave and vacuum dryer, useful for evaporating a liquid from a liquid containing material by means of microwave and vacuum.

This apparatus, especially suitable for continuous dehydration of foodstuffs, comprises a housing forming a closed elongated space, means for evacuating said closed space, means for partitioning the closed space into two chambers which communicate through a slit provided in the partition, a conveyor belt disposed longitudinally in the two chambers, means for feeding on the conveyor belt a material to be evaporated, at least one source of microwave energy fed into the first one of the two chambers by at least one adjustable microwave cavity at atmospheric pressure through an air tight membrane provided on the first chamber.

22 05114684 May 19 1992 422/21 In-line electromagnetic energy  
Dec 13 1990 wave applicator

Inventor: Walker; David R.

Assignee: SeraWaste Systems Corporation

Abstract:

An in-line microwave applicator has an electromagnetic energy wave generating unit which transmits waves, particularly microwaves, dispersing from a longitudinal axis. The dispersing waves are interrupted by microwave diverters which cause the wave lengths to be transmitted through holes from the first chamber to a second surrounding chamber. The second surrounding chamber has interior walls which are reflective to the microwaves and may have a spiral rib to enhance reflectivity. Product for heating is passed through the second chamber to be irradiated by microwaves exiting the holes from the first chamber. The holes are generally elongate in shape and can be surrounded with microwave transparent material to prevent material from falling through. The microwave diverters can be protrusions extending from the holes into the inner chamber by increasing amounts as the distance from the microwave energy generating unit increases. Alternatively, cones placed at varying angles, a generally spiral shape member, or a series of disks can be used as microwave diverters. Product can be carried through the second chamber using a single or variable pitch helix or screw.

23 05501740 Mar 26 1996 118/723 MP Microwave plasma reactor

Mar 29 1994

Inventor: Besen; Matthew M. et al.

Assignee: Applied Science and Technology, Inc.

Abstract:

A microwave plasma reactor including a chamber for containing a gas to be energized into a plasma with microwave energy, an electrode having two surfaces in the chamber for radiating microwave energy from one of the surfaces into the chamber to form the plasma proximate the radiating surface, and a waveguide or coaxial conductor for introducing microwave energy onto the other of the two electrode surfaces for providing the energy to form the plasma.

24 05771693 Jun 30 1998 60/407 Gas compressor

Nov 29 1994

Inventor: Coney; Michael

Assignee: National Power PLC

Abstract:

PCT No. PCT/GB93/01137 Sec. 371 Date Nov. 29, 1994 Sec. 102(e) Date Nov. 29, 1994 PCT Filed May 28, 1993 PCT Pub. No. WO93/24754 PCT Pub. Date Dec. 12, 1993

A gas compressor is provided comprising a chamber (9) to contain gas to be compressed, a piston (12) and the chamber (9) and an apparatus to drive the piston into the chamber (9) to compress the gas. The compressor also comprises another apparatus (5) to form a spray of liquid in the chamber (9) to cool the gas on compression therein, so that the gas may be compressed approximately isothermally. Valve (17) are provided to allow compressed gas to be drawn from the chamber. The apparatus to drive the piston (12) comprises another apparatus to deliver driving energy stored in the fluid directly to the piston. In one embodiment, the driving energy is provided by a combustible fuel. The heat of compression is rejected at the lowest temperatures and the hot exhaust gas from the combustion process may be used to preheat the isothermally compressed gas.

25 05200722 Apr 6 1993 333/252 Microwave window assembly

Nov 27 1991

Status: certificate of correction has been issued

Inventor: Wolf; David

Assignee: United Solar Systems Corporation

Abstract:

A microwave window assembly for transmitting high power microwave energy from microwave propagating means into the interior of a chamber and including first and second windows formed of a dielectric material substantially transparent to microwave energy with the first window sealed in a wall of the chamber and the second window spaced rearwardly from the first window to define a space therebetween. A cooling fluid is circulated

in the space between the windows to cool the window positioned in the wall of the vacuum chamber and a waveguide tube extends from the microwave propagating means to the rear surface of the second window to define a waveguide surface extending from the microwave source to the rear surface of the second window. A clamp plate positioned against the forward surface of the second window includes a window which defines a forward extension of the waveguide surface extending forwardly into the space between the windows to a location proximate the rearward surface of the window positioned in the wall of the vacuum chamber. The second window extends radially outwardly beyond the waveguide surface to define an annular outer window portion outwardly of the waveguide surface and the window assembly further includes a seal plate positioned against the rearward surface of the second window and defining an annular groove confronting the rear surface of the outer annular portion of the second window. An elastomeric annular seal is received in the groove and sealingly engages the rear surface of the outer annular window portion.

26 05507927 Apr 16 1996 204/157.43 Method and apparatus for the  
Sep 1 1993 controlled reduction of organic  
material

Inventor: Emery; Charles L.

Assignee: Emery Microwave Management Inc.

Abstract:

There is provided a new and useful method and apparatus for the controlled non-pyrolytic reduction of organic material comprising subjecting the material to microwave radiation in a reducing atmosphere.

27 04900401 Feb 13 1990 202/117 Continuous pyrolysis system for  
Jun 20 1988 tire shreds

Status: expired - failure to pay first maintenance fee

Inventor: Horton; Norman P.

Abstract:

A continuous pyrolysis system is adapted for continuous pyrolysis of tire shreds with the simultaneous recovery of solid, liquid, and gas pyrolysate. The pyrolysis system includes an anaerobic pyrolyzing chamber with a conveyor for conveying tire shreds therethrough from an infeed end to a solids output end, and a heater for pyrolyzing the tire shreds as they are conveyed. The system also includes a solid pyrolysate output device for removing solid pyrolysate from the chamber, a liquid and gas pyrolysate output device for removing liquid and gas pyrolysate from the chamber, and a tire shred infeed device for feeding tire shreds into the chamber without interrupting either the pyrolysis of tire shreds already in the chamber, or the removal of pyrolystate from the chamber. The tire shred infeed device, and pyrolysate removal devices are each adapted for operation without the introducing substantial amounts of air into the

chamber and without allowing substantial amounts of pyrolysate to escape into the atmosphere.

28 04156394 May 29 1979 110/346 Method and apparatus for thermally  
Nov 28 1977 economical incineration of waste

Inventor: Mallek; Heinz et al.

Assignee: Kernforschungs Anlage Julich GmbH et al.

Abstract:

Ducts for carrying off hot gas given off from the combustion chamber of an incinerator are built into the outer walls of a pyrolysis chamber located above the combustion chamber. The pyrolysis chamber has cross-sectional dimensions that are small enough to assure that heat from the gas ducts in walls completely penetrate the fill of waste in the pyrolysis chamber. Sluice gates are provided between the pyrolysis chamber and the combustion chamber on which the fill of the pyrolysis chamber rests when the gates are quiescent. The gates are moved to allow fragments of the pyrolysis products to drop into the combustion chamber or to turn over material resting on the gates.

29 05512312 Apr 30 1996 426/523 Radiant wall oven and method of  
Dec 14 1994 using the same

Inventor: Forney; Robert B. et al.

Abstract:

An oven for cooking and browning foods has heated, radiant walls. Heat may be supplied by a gas burner flame in a plenum behind the walls, with products of combustion thus being isolated from the food in the oven chamber. In one embodiment food products are continuously conveyed through the oven chamber and are either cooked or simply browned in the oven by the radiant wall heat. Fats and other materials rendered from the food products, if not fully incinerated in the oven chamber, may be transferred along with exhaust air from the oven chamber to a separate combustion chamber, for incineration. Steam or other inert gas is introduced to the oven chamber to minimize oxidation and prevent flame. An alternative wall heating system uses electric resistance heat elements inside a thin ceramic wall. In another embodiment a web-like metal conveyor of a radiant wall oven is returned through the oven in order to heat the conveyor sufficiently to put grill stripes on a product being browned, such as meat. Water spray or other means are included for controlling the temperature of the belt to a desired range. In a further embodiment a radiant wall oven is combined in series with a microwave oven, so that the food products are browned in the radiant wall oven and cooked in the microwave oven.

30 04185181 Jan 22 1980 219/749 Microwave oven  
Oct 17 1977

Inventor: Kaneko; Yoichi et al.

Assignee: Hitachi Heating Appliances Co., Ltd.

Abstract:

A microwave oven having special form of a microwave energy radiation arrangement.

In order to heat uniformly materials to be cooked, the microwave energy radiation arrangement includes a rotatable conductive rod extending into an oven chamber through a hole located substantially in the center of one oven chamber wall, a rotating conductive arm having one end fixed on the rod so as to extend transversely thereto, and a conductive plate having the center thereof coincident with the axis of the rod and arrayed such that the rotating arm is interposed between the one wall and the conductive plate. Openings for radiating microwave energy into the oven chamber are formed at the periphery of the conductive plate.

31 04052265 Oct 4 1977 201/2.5 Process for the pyrolytic  
Jan 12 1976 treatment of organic, pseudo-  
organic and inorganic material

Inventor: Kemp; Klaus M.

Abstract:

Organic and pseudo-organic materials such as waste materials, for example, are processed in a converter system and decomposed into various usable and reusable forms. Inorganic metals and salts are treated likewise in the same converter system and processed into various usable and reusable forms. While being carried by a conveyor through a controlled atmosphere treatment chamber, virtually free from combustion supporting air or other oxidizing agents, the feed material is caused to progressively thermally break down into its more basic constituents which flow out of the material treatment chamber in a continuous liquid and gaseous vapor stream. Negative pressure is applied upstream from the material treatment chamber to lead the liquid and gaseous vapor stream through successive processing stages of collection containers, condensers and gas scrubbers. The variable negative pressure is sufficient to maintain the pressure in the material treatment chamber within a range of slightly above ambient pressure. Decomposed matter entrained in and constituted by the liquid gaseous, and vapor stream is continuously recovered for use and reuse while being cycled through the converter system.

32 05487873 Jan 30 1996 588/212 Method and apparatus for treating  
Nov 7 1994 hazardous waste or other  
hydrocarbonaceous material

Inventor: Bridges; Jack E. et al.

Assignee: IIT Research Institute

Abstract:

Methods and apparatus for treating waste with radio frequency include a wall defining a radio frequency treatment chamber through which waste may be passed. A source of radio frequency-energy energizes the radio frequency treatment chamber to heat the waste and drive off vapors therefrom leaving solid residue to be disposed of. A guard heater and/or insulation maintains the wall at substantially the same temperature as the waste being heated by the radio frequency to prevent vapors from condensing on the waste.

33 05578700 Nov 26 1996 528/501 Continuous vacuum microwave rubber  
May 1 1995 crumb reclamation unit

Inventor: Hunt; James R. et al.

Assignee: Hunt Industries Inc.

Abstract:

The invention provides an apparatus and method of its use, for recovering either devulcanized rubber or purified carbon and volatiles from a crumb rubber feed material. The apparatus comprises a chamber; a vacuum pump for providing reduced pressure within the chamber; an inlet for feeding crumb rubber into the chamber; an auger for providing continuous movement of the crumb rubber through the chamber; a battery of microtrons for providing substantially precise energy input into the crumb rubber as it is continuously moved through the chamber by the auger; at least one condenser for recovering volatiles from the crumb rubber after it has been sufficiently heated by said the microtrons; and an outlet for withdrawing either a devulcanized rubber or a purified carbon product residue from the chamber.

34 04308807 Jan 5 1982 110/257 Apparatus for pyrolysis of  
Mar 17 1980 municipal waste utilizing heat  
recovery

Inventor: Stokes; Samuel L.

Abstract:

Apparatus for pyrolytically treating municipal and other waste comprised of solid heat-decomposable material by radiative heating from an open flame and convective heating, the invention particularly provides for heat recovery of a substantial amount of initial energy input. In the several embodiments of the invention, the source of initial heat energy input can vary from gasification of renewable fuel such as wood chips and the like to burning of a primary fuel, such energy input being preferably augmented by burning of at least a portion of the gaseous pyrolytic decomposition gases produced by treatment of the waste. Heat generated during the process of pyrolyzing waste is also utilized to warm combustion air as well as recovered to the extent possible for heating purposes or for the accomplishment of useful work. The present apparatus further provides particular structure capable of handling the waste both prior to

and subsequent to subjection to the pyrolysis process, the apparatus also including particular structure for holding the waste during the pyrolysis process.

35 03945890 Mar 23 1976 202/84 Converter system

Jul 26 1974

Inventor: Kemp; Klaus M.

Abstract:

Organic and pseudo-organic materials, such as waste materials, for example, are processed in a converter system and decomposed into various usable and reusable forms. Inorganic metals and salts are treated likewise in the same converter system and processed into various usable and reusable forms. While being carried by a conveyor through a controlled atmosphere treatment chamber, virtually free from combustion supporting air or other oxidizing agents, the feed material is caused to progressively thermally break down into its more basic constituents which flow out of the material treatment chamber in a continuous liquid and gaseous vapor stream. Negative pressure is applied upstream from the material treatment chamber to lead the liquid and gaseous vapor stream through successive processing stages of collection containers, condensers and gas scrubbers. The variable negative pressure is sufficient to maintain the pressure in the material treatment chamber within a range of slightly above ambient pressure. Decomposed matter entrained in and constituted by the liquid and gaseous vapor stream is continuously recovered for use and reuse while being cycled through the converter system.

36 05098665 Mar 24 1992 422/108 Device for heating of articles and

Apr 12 1988 organisms

Inventor: Katschnig; Helmut et al.

Assignee: Katschnig; Helmut

Abstract:

A device is disclosed for heating of articles and organisms, and in particular for destroying or rendering harmless organisms containing nucleic acids and/or proteins by action of microwave radiation generated by a microwave emission device. The microwave emission device illustratively comprises a plurality of magnetrons emitting microwave radiation into a sterilization chamber and configured such that cold spots are avoided. The invention further relates to a microwave radiation level monitoring device positioned in the vicinity of areas of likely microwave leakage such as a door to the sterilization chamber.

37 05156098 Oct 20 1992 110/238 Two chamber burner apparatus for

Jan 6 1992 destroying waste liquids

Inventor: Camp; John D.

Assignee: Bailey; William W.

Abstract:

A burner apparatus provides on-site destruction of waste liquids such as liquid anti-freeze, waste motor oil, and the like independently of the liquid concentration thereof. The apparatus comprises a storage tank for waste liquid including a reservoir and a level sensor for sensing the level of the waste liquid in the reservoir, and a burner unit energized responsive to the level sensor when the level of waste liquid exceeds a predetermined value. The burner unit includes first and second chambers connected together by a flame port provided between the chambers at the bottom of the chambers. An atomizing injector injects waste liquid from the storage tank, in an atomized form, into a flame produced by a first burner located at the top of the first chamber so that combustion products that are produced fall towards the bottom of the first chamber and pass through the flame port into the second chamber. A second burner burns combustion products exiting from the flame port into the second chamber.

38 05492657 Feb 20 1996 264/83 Method for processing rubber  
Apr 22 1994 products

Inventor: Danschikov; Eugene V. et al.

Abstract:

An apparatus and method for energy efficient recycling of reinforced rubber products, such as tires, conveyor belts, and the like, wherein the rubber is reinforced by cords or belts of steel, nylon, fabric and the like. The presence of the reinforcement materials poses not only a necessity to separate the rubber therefrom but also poses a problem of disposing of the reinforcement materials. By placing the reinforced rubber in an environment of ozone (O<sub>3</sub>) and applying a force to the rubber, the rubber breaks down leaving the reinforcement materials for ready disposal. The method and apparatus thereby provide an energy efficient, cost-effective, and environmentally safe and acceptable technique for recycling reinforced rubber products.

39 04752663 Jun 21 1988 219/746 Counter-top microwave oven with  
Mar 4 1987 horn and diffusing lens

Status: expired - failure to pay first maintenance fee

Inventor: Meisel; Nicholas

Assignee: Quindicum Limited

Abstract:

A microwave oven the rectanguloid heating chamber 6 of which has at least two dimensions less than a wavelength of the energy supply thereto and capable of heating between 60-100 grams of food to an edible temperature in 30 seconds or less is provided. The oven comprises a housing 1 coupled to an energy source 2 by way of a coaxial cable 3 and a waveguide 4. The waveguide 4 has a horn 5 providing the transition to the



chamber 6 encased by the housing 1. The larger end of the horn 5 feeds into the chamber 6 while the smaller end is connected to the waveguide 4. A lens essentially comprising a laminate assembly of dielectric material plates 11,12 carrying a prism 11 directed into the waveguide 4 is positioned between the horn 5 and the chamber 6. The chamber 6 has a volume of about 0.00168 cubic meters and the power input of the oven is between 600 and 1200 watts.

40 04339999 Jul 20 1982 110/226 Combination refuse pyrolysis and  
May 13 1981 moisture reduction apparatus

Inventor: Fio Rito; William M. et al.

**Abstract:**

An improved method and apparatus for pyrolyzing waste materials and recovering useful chemical and energy rich materials therefrom. The apparatus of the invention comprises a specially designed, rotatable pyrolysis chamber and a cooperating rotatable moisture reduction chamber which pretreats the refuse prior to its introduction into the pyrolysis chamber. The pyrolysis chamber and the moisture reduction chamber are uniquely interconnected so that a portion of the heat of combustion of the refuse is taken from the pyrolysis chamber and controllably introduced into the moisture reduction chamber to reduce the moisture content of the refuse which is continuously received therein. The outlet of the moisture reduction chamber is interconnected with the inlet of the pyrolysis chamber so that, in operation, the refuse received into the pyrolysis chamber is controllably pre-dried prior to pyrolysis. When the apparatus is at operating temperature, a portion of the combustible gases generated by the pyrolysis of the refuse is continuously mixed with air and the combustible gaseous mixture thus formed is used to sustain pyrolysis within the pyrolysis chamber. //

41 04207452 Jun 10 1980 219/687 Activated gas generator  
Apr 19 1978

Inventor: Arai; Sakae

Assignee: Tokyo Shibaura Electric Co., Ltd.

**Abstract:**

An activated gas generator which comprises a microwave absorber containing, for example, water and surrounding a dielectric tube concurrently to absorb microwaves leaking along the dielectric tube and also cool it. The dielectric tube is formed in a gas pipe which extends through a microwave irradiation furnace and which is connectable at a raw gas source and at its other end to a reaction chamber and a vacuum pump. The microwave absorber is mounted at least to a portion of the tube adjacent to the reaction chamber and vacuum pump.

42 05385307 Jan 31 1995 241/41 Cryogenic tire recycling system

Dec 27 1993

Inventor: Azar; Essa T.

Abstract:

The raw material in used tire carcasses is reclaimed by cutting the tire into quarter segments and freezing the segments with liquid nitrogen in a controlled environment freezing chamber. Rotary air locks pass material to and from the chamber. Steel and fiber materials are removed in a stripping chamber where the frozen rubber both broken into smaller chunks. A robot arm with magnets and hooked fingers removes the fiber and steel. The rubber chunks are then pressed through dies to reduce the size to a uniform rubber crumb. The press consists of multiple pointed fingers in registration with multiple sized holes in a screen type die. The rubber crumb is removed with a suction device and dried using heat from a closed loop nitrogen cycle on the way to collection containers.

43 05166487 Nov 24 1992 219/683 Cooking oven with convection and  
Dec 15 1989 microwave heating

Inventor: Hurley; James R. et al.

Assignee: Tecogen, Inc.

Abstract:

An apparatus for cooking an article is provided including a cooking chamber, a heating means for producing heated gases for introduction into said chamber for convective heating without microwave interference, and a source of microwaves for heating with microwave energy. At least one freely rotating stirring means is positioned in gas and microwave communication with the heating chamber, and is caused to rotate from a flow of the heated gases. The stirring means serves to distribute both microwave energy and the heated gases about the chamber for uniform, simultaneous convection and microwave heating. A pilotless gas source is provided which includes an initiation chamber within a combustion chamber. The initiation chamber is positioned by a microwave opaque material and includes a flame sensor which eliminates the flow of gas in the combustion chamber when no flame is present.

44 05024716 Jun 18 1991 156/345 Plasma processing apparatus for  
Jan 12 1990 etching, ashing and film-formation

Inventor: Sato; Yasue

Assignee: Canon Kabushiki Kaisha

Abstract:

A plasma processing apparatus includes a vacuum vessel defining a discharge chamber and is provided at least with a source gas supply for supplying a processing gas into the discharge chamber, a magnetic field creating device, and a microwave introducing device. The microwave introducing device employs a microwave radiating member having the shape of a flat plate and provided with a cut. The plasma processing apparatus

is capable of uniformly processing a work with a plasma and efficiently applying a microwave only to the work. The periphery of a microwave transmission window is tapered, so that the microwave transmission window can be attached, adhesively and hermetically, to a microwave launcher in a simple construction, whereby the reliability of the adhesive attachment of the microwave transmission window to the microwave launcher is enhanced.

45 05034086 Jul 23 1991 156/345 Plasma processing apparatus for  
Nov 2 1990 etching, ashing and film-formation

Status: certificate of correction has been issued

Inventor: Sato; Yasue

Assignee: Canon Kabushiki Kaisha

Abstract:

A plasma processing apparatus includes a vacuum vessel defining a discharge chamber is provided at least a source gas supply for supplying a processing gas into the discharge chamber a magnetic field creating device, a microwave introducing device. The microwave introducing device employs a microwave radiating member having the shape of a flat plate and provided with a cut. The plasma processing apparatus is capable of uniformly processing a work with a plasma and efficiently applying a microwave only to the work. The periphery of a microwave transmission window is tapered, so that the microwave transmission window can be attached adhesively and hermetically to a microwave launcher in a simple construction, whereby the reliability of the adhesive attachment of the microwave transmission window to the microwave launcher is enhanced.

46 05408846 Apr 25 1995 62/381 Apparatus for preparing rubber and  
Feb 17 1994 other materials for recycling

Inventor: Reali; Angelo et al.

Assignee: Crumbrubber Technology Company, Inc.

Abstract:

There is provided a cooling device for lowering the temperature of rubber or polystyrene materials for recycling purposes. The cooling device has an input feeder which inputs the material to be treated into a cooling chamber. The cooling chamber is an elongated chamber. The cooling chamber receives cold air from an external air refrigeration unit and circulates that air within the chamber. The material input into the cooling chamber is circulated therein by a circulating shaft. After 15-20 minutes, the input material is discharged through an output on the opposite end of the cooling chamber. The temperature of the material discharged is -80 C. or lower.

47 03768424 Oct 30 1973 110/212 APPARATUS AND METHOD FOR THE  
Jan 7 1972 PYROLYSIS OF SOLID WASTE MATERIAL

Inventor: Hage; William T.

Assignee: Mechtron International Corporation

**Abstract:**

A method and apparatus for the disposal of solid material, utilizing a pyrolytic decomposition chamber for heating the material to its decomposition temperature in the absence of air and utilizing the vaporized material therefrom with air and a combustible gas, such as propane, in a combustion chamber for the further reduction of the vaporized material. The heat generated in the combustion chamber is utilized through a heat exchanger to transfer heat to the primary heating chamber.

48 04681599 Jul 21 1987 48/92 Gassification of carbon containing  
Sep 16 1985 waste, refuse or the like

Inventor: Obkircher; Bernt

Assignee: Dornier System GmbH

**Abstract:**

Waste or refuse is fed to a first reaction chamber communicating with a second one through openings in the lower portion of a partition between the chambers and hot metal or the like is fed into at least one of the two chambers; gas is extracted from the second chamber and the pressure conditions are such that different liquid levels obtain in the two chambers causing reaction gas to bubble through the openings and the liquid in the second chamber. The principle product gases extracted are hydrogen, carbonoxide and inert gases. Lime is preferably added to the waste to be processed.

49 04476362 Oct 9 1984 219/748 High frequency heating apparatus  
Jan 24 1983

Inventor: Kusunoki; Shigeru et al.

Assignee: Matsushita Electric Industrial Co., Ltd.

**Abstract:**

The present invention is a high frequency heating apparatus which has a high frequency oscillator for radiating high frequency energy when energized by a high voltage, a waveguide for propagating the high frequency energy from the high frequency oscillator to a heating cavity or heating chamber of the apparatus in which an object to be heated is placed, and an electric wave radiating member provided between and extending into the waveguide and the heating chamber. The electric wave radiating member both couples, through electric waves, the waveguide with the heating chamber and also radiates the high frequency energy into the heating chamber for uniform heat distribution within the heating chamber.

50 04805318 Feb 21 1989 34/279 Acoustically enhanced heat  
Jul 10 1987 exchange and drying apparatus

Status: expired - failure to pay second maintenance fee

Inventor: Bramlette; T. Tazwell et al.

Assignee: The United States of America as represented by the United States  
Department of Energy

**Abstract:**

A heat transfer apparatus includes a first chamber having a first heat transfer gas inlet, a second heat transfer gas inlet, and an outlet. A first heat transfer gas source provides a first gas flow to the first chamber through the first heat transfer gas inlet. A second gas flow through a second chamber connected to the side of the first chamber, generates acoustic waves which bring about acoustical coupling of the first and second gases in the acoustically augmented first chamber. The first chamber may also include a material inlet for receiving material to be dried, in which case the gas outlet serves as a dried material and gas outlet.

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